UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

Area VIII - Alaska

EXAMINATION REPORT

WINDY CREEK COPPER PROSPECTS

by

A. L. Kimball

Area VIII Mineral Resource Office
Juneau, Alaska

Report No. 1596 May 1967

OFFICIAL USE ONLY
Not for distribution outside the Bureau of Mines

CONTENTS

ILLUSTRATIONS

TABLES

WINDY CREEK COPPER PROSPECTS[1/]

by

A. L. Kimball[2/]

ABSTRACT

Two groups of copper lode claims in the Windy Creek-Denali area were visited by Bureau of Mines engineers in September 1966. These claims lie on the south side of Windy Creek in the western part of a northeast-trending copper belt which extends from the Susitna River to the Maclaren River.

The prospects consist of veins, pods, mineralized shears, and amygdules in partially altered volcanic rocks of Triassic(?) age.

One zone less than 100 feet long assayed 3-1/2 percent copper across nearly 3 feet of width, the widest point. It narrows quickly in both directions. The other prospects seen had shorter strike lengths, lower assay values, and were not so wide. Some assay samples contained a trace of gold and up to 1/2 ounce silver per ton.

A suite of local rock types collected for classification contained traces of copper petrographically, but no copper minerals were identified.

INTRODUCTION AND SUMMARY

Some copper prospects in the Windy Creek-Clearwater Mountains area were visited September 1-5, 1966, as part of Central Alaska mineral investigations. Samples from this area containing copper had previously been given to the Bureau. The prospects examined lie in a 1- by 4-mile band in the lower left limit drainage of Windy Creek, which is north of the Denali Highway and just east of the Susitna River.

Small, widely separated showings of copper minerals are localized in veins, pods, shears, and amygdules in intermediate to basic volcanic flows, and are part of a broader belt trending northeasterly containing copper mineralization intermittently for many miles.

1/ Work on manuscript completed April 1967.

2/ Mine examination and exploration engineer, Area VIII Mineral Resource Office, Bureau of Mines, Juneau, Alaska.

In addition to the dozen or so small prospects seen, fragments of copper-bearing float were found in many places throughout the area visited.

The examination ended prematurely because of snow.

LOCATION AND ACCESSIBILITY

The copper showings are in the western Clearwater Mountains on the south side of Windy Creek (figs. 1-2). Windy Creek flows west into the Susitna River approximately 40 miles south of its headwaters in the eastern Alaska Range.

The showings visited are distributed over a 1- by 4-mile area 4 to 8 miles above the mouth of Windy Creek (fig. 3), centered at latitude 63°06' N and longitude 147°20' W.

The Denali Highway, not maintained during winter, crosses the Susitna River at the confluence of Windy Creek with the Susitna River. Susitna Lodge is 1/2 mile east, while the old placer mining settlement, Denali, on Valdez Creek, lies 5 miles north by trail.

A tractor-swamp buggy trail winds along the south bench of Windy Creek giving access to the full length of creek bottom for suitable vehicles.

The copper showings are between 1,000 and 2,000 feet above the valley floor in rugged topography and must be reached on foot. Some of the area is inaccessible for all practical purposes.

HISTORY AND OWNERSHIP

The occurrence of copper in the Windy Creek area very likely has been known for some time as placer gold was discovered on Valdez Creek, 5 miles north, in 1903. There has been no recorded copper production from the Windy Creek area, however.

Two groups of claims are reportedly held in the area covered by this September 1966 reconnaissance.

According to Clarence "Tex" Greathouse, one of three partners, who lives near the Susitna Lodge, the Beggar prospect (localities 1-7, fig. 3), consists of 44 unpatented lode claims. A second owner, Erv. Brakefield, lives just south of Delta Junction. Rolli Emerick, the third partner, died during the past winter (1966).

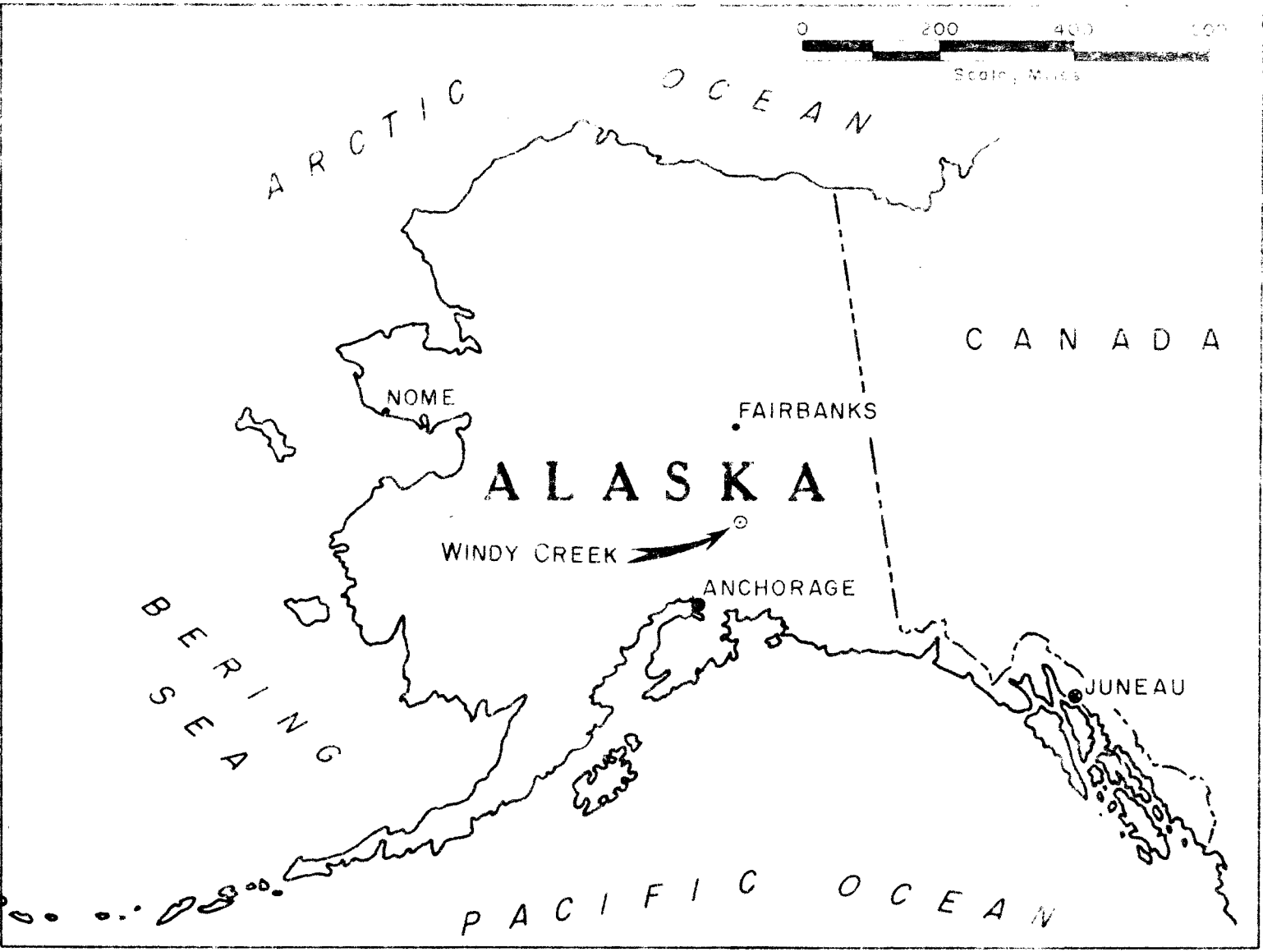

FIGURE 1.- Index Map of Alaska.

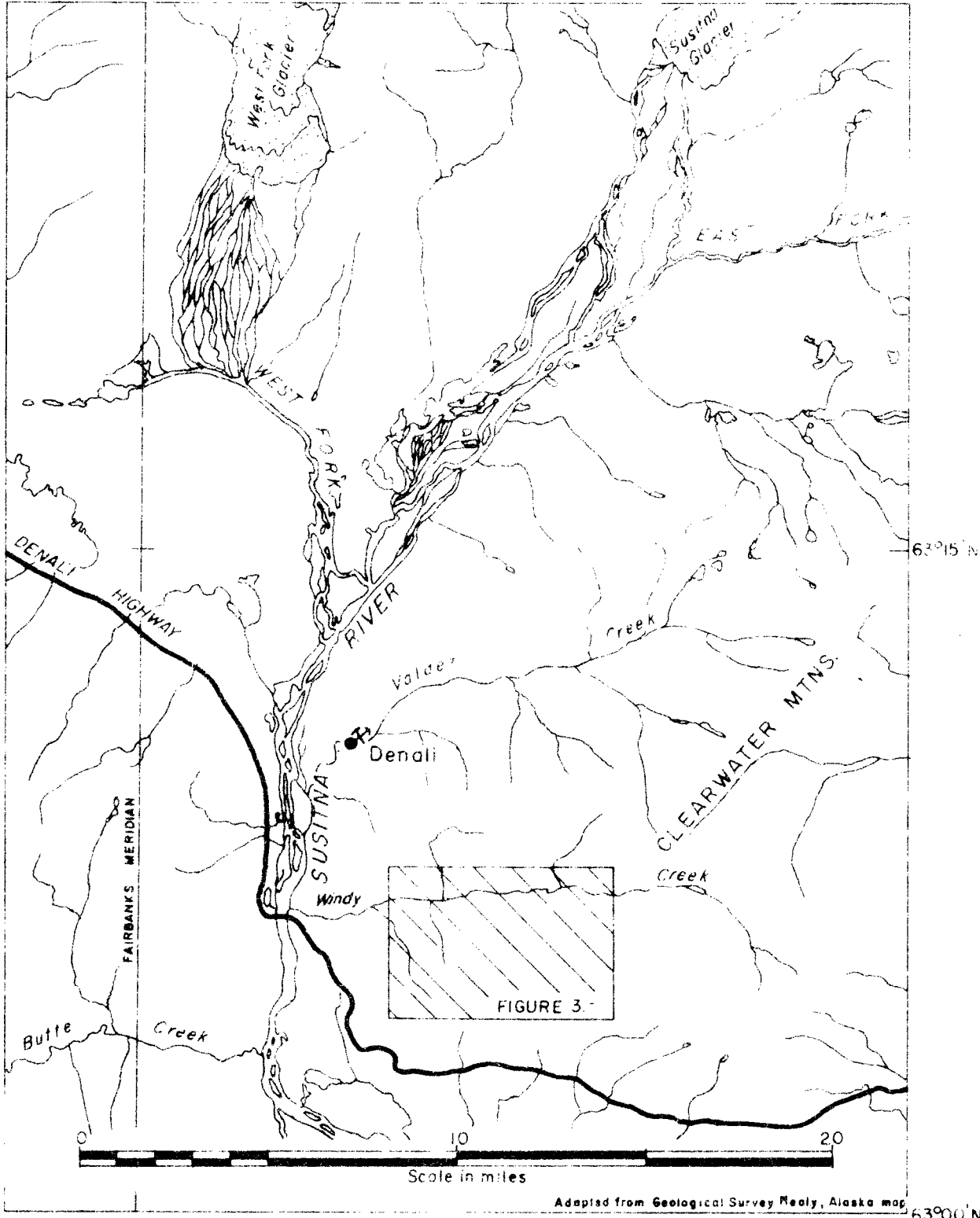

FIGURE 2.- Windy Creek, Denali Area, Alaska

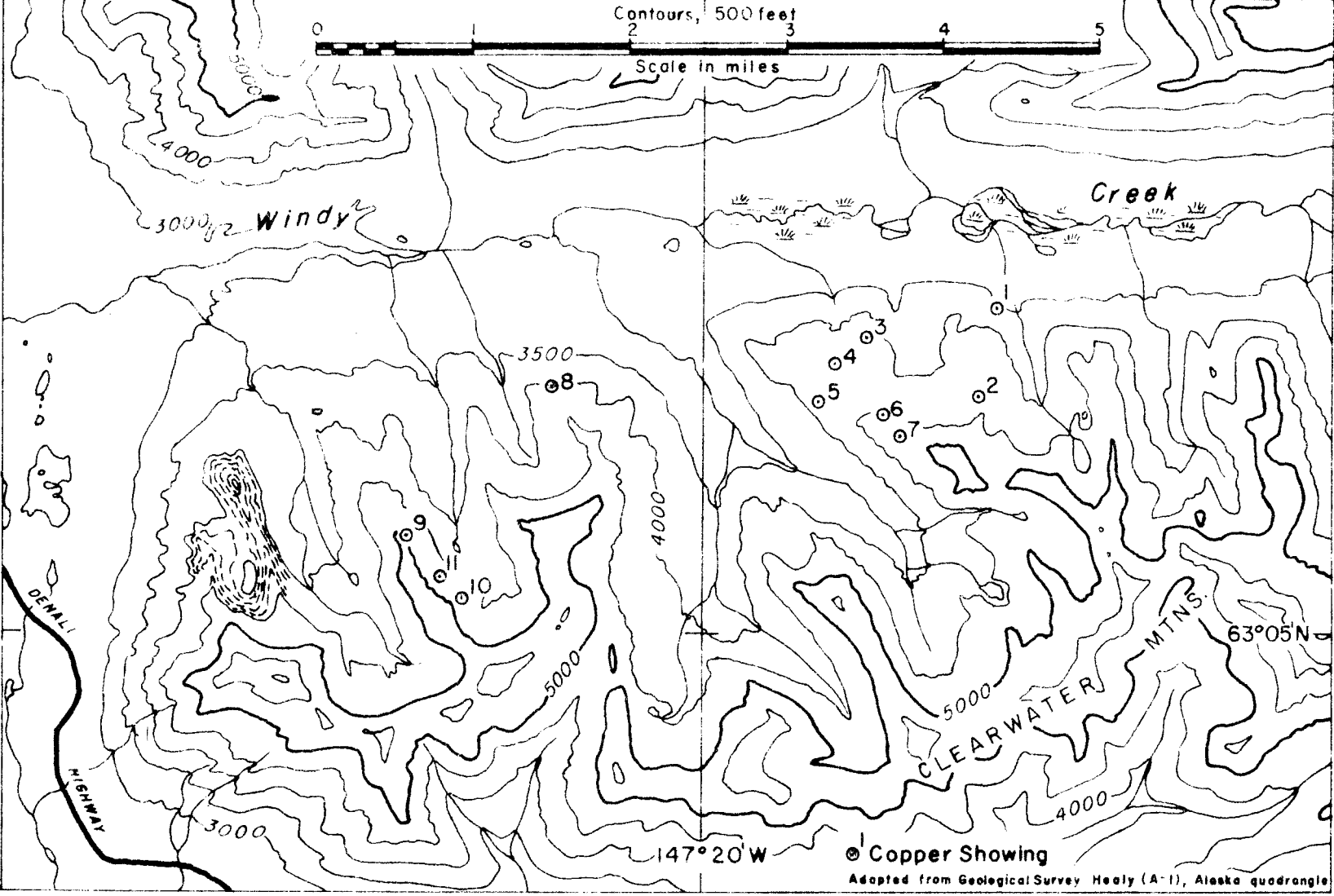

FIGURE 3.- Windy Creek Copper Localities.

The other group, consisting of two unpatented lode claims, known as the Fault Creek prospect (localities 9-11, fig. 3), is held by Tex Greathouse.

Robert H. Saunders, mining engineer, and Moe A. Kaufman, geologist, both formerly of the Alaska Division of Mines and Minerals have visited this area and published reports.

Saunders' report, "Denali-Susitna Area," was published as a chapter in the Division of Mines and Minerals Annual Report, 1961, while Kaufman's report, "Geology and Mineral Deposits of the Denali-Maclaren River Area, Alaska" Division of Mines and Minerals Geologic Report No. 4, May 1964, the result of later and more extensive work, was published as a separate report.

Both covered a far larger area than the September 1966 reconnaissance, and both visited and described the best showing sampled and described in this report.

PHYSICAL FEATURES AND CLIMATE

The Clearwater Mountains lie just south of the Alaska Range midway between The Alaska Railroad and the Richardson Highway. The Windy Creek valley is a broad, U-shaped, steep-sided, typical glacial valley with a floor elevation of approximately 3,000 feet in its central section. It drains into the Susitna River to the west at a 500-foot lower elevation.

The copper prospects are between 4,000 and 5,000 feet in elevation on prominent spurs extending north to Windy Creek from a 6,000-foot-high east-trending ridge. These spurs have lower slopes of talus with cliffs and serrate ridge crests above. The topography in many places is very precipitous.

Sparse spruce grow in the lowlands along the Susitna River; however, most of the Windy Creek valley floor is covered with willow and alder. Occasionally, small spruce grow in the lower valley. Vegetation is limited to grass and moss above 3,500 feet.

No weather stations are located nearby; however, long-term records have been kept at Mount McKinley National Park, 60 miles to the northwest. There, average January, June, and annual temperatures are approximately 1.4°, 54.6°, and 27.4° F, respectively. Annual precipitation is in the vicinity of 20 inches.

GENERAL GEOLOGY

The rocks in the area visited are dominantly volcanic flows of Mesozoic age (probably Triassic).[3/4/] Most are basic in composition and include fine- and coarse-grained varieties. Some are greenstones. Some flows are vessicular, probably in their upper parts. Calcite, quartz, copper minerals, and occasional native copper were identified in amygdaloidal filling.

Strikes, generally N 50° to 70° E, with 35° to 50° NW dips, are vaguely apparent from the overall aspect of the flows; however, contacts are usually not clearly discernible on close inspection. There are occasional lenses or thin beds of iron-stained calcareous rocks. There are numerous small faults, but no clearly defined major ones, though the Fault Creek fault is traceable for several thousands of feet. A dike of dioritic composition parallels this fault.

Copper mineralization occurs in veins, in pods, in shear zones, and as amygdules. Petrography did not reveal copper minerals in specimens of volcanic rocks collected away from visible copper mineralization.

DESCRIPTION OF MINERAL LOCALITIES

The best of the copper showings seen during this examination are described below. Numbers refer to positions on location map, figure 3. Table 1 gives sample descriptions and assay results.

1. Basic volcanic rocks rich in epidote in a 15-foot hand trench in talus contain small amygdules of quartz and copper minerals with some native copper (sample No. 1). Occasionally, similar material was found in talus elsewhere on the mountainside. None was in place.

2. A zone of clayey gossan (sample No. 3) 100 feet wide lies between dark coarse-grained volcanics and is probably a fault. It appeared to trend east, but was not readily traceable.

Trace amounts of copper and zinc were found petrographically, and the clays are fairly fresh.

3. Several shallow hand diggings are aligned N 60° W across a hogback for 25 feet and expose discontinuous secondary copper mineralization and

---

3/ Ross, C. D. The Valdez Creek Mining District, Alaska. U.S. Geol. Survey Bull. 849-H, 1933, 41 pp.

4/ Moffit, F. H. Headwater Regions of Gulkana and Susitna Rivers, Alaska, With Accounts of the Valdez Creek and Chistochina Placer Districts. U.S. Geol. Survey Bull. 498, 1912, 82 pp. and plate II.

minor sulfides as irregular pods lacking clear shape or strong orientation (sample No. 4). The host rock is altered serpentine. There are some thin lenses or interbeds of rusty limey sediments locally and at several other points in the area.

4. A series of hand pits, aligned N 50° to 70° E for 50 feet or more, parallel vaguely disconnected rusty limey sediments(?) in basic volcanics. Some of these limey rocks appear to be blocky inclusions. The volcanics strike parallel to pit alignment and dip gently northwest. Channel samples Nos. 5, 6, and 7 cross in continuous section the most intense copper mineralization. Copper minerals are spotty and appear to be concentrated in small pods or kidneys.

5. Several parallel epidote stringers oriented N 70° E and about vertical contain sparse copper mineralization across an 8-foot zone exposed 20 feet along strike in a small gully. Most of the copper is in a 1-foot band (samples Nos. 8 and 9).

6. An irregular vein of quartz and epidote with minor copper minerals crosses a volcanic greenstone outcrop. It strikes N 70° E with a steep southeast dip and has a maximum width of 0.6 foot. The vein is covered by talus to the northeast and pinches out 30 feet to the southwest.

7. An irregular one-fourth inch vein of bornite and chalcocite in a narrow zone of secondary copper minerals crosses a hogback, but is traceable for only a few feet. The zone is oriented N 70° E with a 60° SE dip.

8. A 1-foot-thick kidney of quartz and secondary copper minerals in serpentinized volcanics in a vertical north-trending shear in the side of a small gully. There is some brown limey brecciated rock nearby.

Three hundred yards east a one-fourth inch stringer of bornite and chalcocite follows a joint plane in black serpentinized volcanics. Dirty brown limey float lies on the hillside above.

Localities 9, 10, and 11 are in or near a fault zone paralleling a 20-foot dike of quartz diorite. This zone strikes N 35° to 50° W, has a vertical to 80° SW dip, and is traceable several thousand feet across spurs and cliffs of the tilted volcanic flows. Copper mineralization is found at several points along it.

The best looking concentration of copper minerals was seen at the Fault Creek prospect (11), and is therefore described prior to Nos. 9 and 10.

11. Here, copper carbonates with bornite and chalcocite are intermixed with masses of calcite, epidote, and quartz veins in the fault zone. At

the widest point a 2.95-foot stratigraphic channel sample (No. 23) was taken across the total mineralized width. Samples Nos. 22 and 24 are sections of foot and hanging walls, respectively, and are in sequence with No. 23. The mineralized zone narrows along the fault in both directions from the sampled point and has a total observed mineralized length of less than 100 feet. It passes beneath talus 50 feet to the southeast and is visible for a few feet to the northwest and again approximately 30 feet from the sampled section, where the mineralized exposure is vertical and virtually inaccessible. It was here estimated to be 15 to 18 inches wide. The fault zone is hidden and inaccessible for some distance northwest of this point.

9. A small concentration of copper minerals in random joints in volcanic rocks lies just southwest of the Fault Creek fault zone in a large hand pit packed with hard new snow. Orientation of the localization is vague and extent is probably not more than a few feet. Sample 15 represents the best copper mineralization seen. A 10-foot-thick bed of gray limestone with an attitude of N 45° E at approximately 45° NW paralleling volcanics, strikes toward the prospect from the northeast. It is probably displaced by the fault as it was not found in the prospect vicinity.

Minor copper carbonate paint was seen in the fault zone a few hundred feet to the northwest.

The volcanic rocks of the general area, where attitudes were discernible, had strikes between N 45° and 70° E with dips of 35° to 50° NW.

10. Three samples (Nos. 19, 20, and 21) were taken at this locality where gouge, crushed quartz, and minor amounts of copper minerals were seen. They represent an aggregate thickness of 1.95 feet.

At numerous places throughout the area, small fragments of float contained copper minerals, though the total amount of copper was small.

TABLE 1. - Windy Creek copper, assay sample results

Sample No.	Percent copper	Ounce per ton Gold	Ounce per ton Silver	Sample type	Sample width	Mineral locality	Remarks
4	3.72	0.01	0.48	Grab	-	3	High grade.
5	2.94	Trace	.46	Channel	0.8	4	) Continuous stratigraphic
6	2.72	Nil	Nil	..do...	1.2	4	) section across lenticu-
7	2.70	Nil	.49	..do...	.3	4	) lar pod.
8	1.26	Nil	.25	..do...	1.0	5	Zone of epidote and copper sulfides.
14	.80	Nil	.09	..do...	1.5	9	) Continuous section across
15	1.80	Trace	.07	..do...	1.8	9	) pod. Length vague, but
16	.13	Nil	Nil	..do...	.5	9	) probably not great.
19	.53	.005	.02	..do...	.5	10	Crush zone) Continuous
20	.04	Nil	Nil	..do...	1.0	10	Gouge zone) section.
21	.89	Nil	.10	..do...	.45	10	Sulfides and) Fault Creek quartz.) fault zone.
22	.05	Nil	.02	..do...	.6	11	Serpentinized) Continuous footwall.)
23	3.56	Nil	.02	..do...	2.95	11	Fault zone) section. with irregu-) lar veins.) Fault
24	.13	Nil	.07	..do...	.5	11	Epidotized) hanging) Creek wall.) fault zone.

TABLE 2. - Windy Creek copper, petrographic results

	Sample No.						
	1	3	4	6	9	15	23
Spectroscopic:							
Fe	X	X	X	X	X	X	X
Mg	X	X	X	X	X	X	X
Cu	X	T	X	X	X	X	X
Zn	N	T	N	T	N	N	N
Ag	N	N	N	N	T?	N	N
Bi Ga In Mo Ni Pb	N	N	N	N	N	N	N
Sn Be Nb Y Zr	N	N	N	N	N	N	N
Rocks:							
Altered igneous rock	-	-	-	C	C	-	-
Altered serpentine	-	-	C	-	-	-	-
Clayey gossan	-	C	-	-	-	-	-
Epidosite	C	-	-	-	C	C	-
Vein (sulfide)	-	-	-	-	-	-	C
Minerals:							
Albite-oligoclase	-	-	-	S	-	-	-
Biotite + hornblende	-	-	-	-	-	T	-
Bornite	-	-	M	-	T	T	S
Calcite	-	-	-	S	-	-	A
Chalcocite (+ digenite?)	T	-	M	-	F	F	S
Chalcopyrite	-	-	T	-	-	-	-
Chlorite	-	S	P	P	A	-	-
Copper	M[1/]	-	-	-	-	-	-
Covellite	-	-	-	T	M	T	F
Cuprite	T	-	-	-	-	-	-
Copper-oxide minerals	T	-	F	S	M	S	S
Epidote	P	-	T	-	A	P	A
Goethite	T	T	-	T	-	-	-
Kaolin	-	S	S	-	-	-	-
Limonite	-	P	-	-	-	-	-
Montmorillonite	-	F[2/]	-	-	-	-	-
Quartz	S	-	T	S	S	S	A

Legend:

P--Predominant, over 50 percent.
A--Abundant, 10 - 50 percent.
S--Subordinate, 2 - 10 percent.
M--Minor, 0.5 - 2 percent.
F--Few, 0.1 - 0.5 percent.
T--Trace, less than 0.1 percent.
N--Sought but not detected.
X--Detected.
C--Rock classification.

1/ Silver was not detected.
2/ Tentatively.

Radioactivity and fluorescence were not detected.
Spectroscopic: Nickel: lower limit 0.07 percent Ni.

TABLE 3. - Windy Creek copper, petrographic results

	Sample No.									
	2	11A	11B	11C	12	13	17	18	22	24
Spectroscopic:										
Cu	T	T	T	T	X	T	X	T	X	X
Cr Mn Zn	T	T	T	T	T	T	T	T	T	T
Ti	T	T	T	X	T	X	T	X	X	T
V	T	T	T	T	T	T	N	T	T	T
Ga	N	N	T	T	N	T	N	T	T	N
Ag Bi In Mo	N	N	N	N	N	N	N	N	N	N
Ni Pb Sn	N	N	N	N	N	N	N	N	N	N
Rocks:										
Altered andesite	-	-	-	C	-	C	-	-	C	-
Altered serpentine[1/]	-	-	C	-	-	-	-	-	-	-
Calcite veinlets	-	-	-	-	C	-	-	-	-	-
Epidosite	-	-	-	-	-	-	C	-	-	C
Greenstone	-	-	-	-	-	-	-	C	-	-
Hydrothermal breccia	-	-	-	-	C	-	-	-	-	-
Siliceous dolomite	-	C	-	-	-	-	-	-	-	-
Siliceous dolomite breccia	C	-	-	-	-	-	-	-	-	-
Minerals:										
Albite-oligoclase	-	-	-	P	S	P	-	S	A	-
Augite	-	-	-	A	-	-	-	-	A	-
Bornite[1/]	-	-	-	-	T	-	-	-	-	-
Calcite	F	-	P	-	S	-	-	-	-	S
Chalcocite + covellite	-	-	-	-	T	-	-	-	-	-
Chlorite	-	-	A	A	S	A	M	P	A	-
Copper oxide	-	-	-	-	-	-	-	-	T	T
Cryptocrystalline quartz	S	A	-	-	M	-	-	-	-	-
Dolomite	P	P	F	-	A	-	-	-	-	N
Epidote	-	-	-	-	-	-	P	-	F	P
Goethite-limonite	M	M	-	S	S	-	-	-	T	-
Hornblende	-	-	-	-	-	-	S	-	-	-
Kaolin	-	-	-	-	M	-	-	-	-	-
Magnetite	-	-	-	-	-	S	M	T	T	-
Quartz	F	F	-	-	-	-	S	M	-	S
Sanidine	-	-	-	-	-	-	-	-	S	-
Unidentified hydrothermal silicate with index less than 1.6.	-	-	-	-	A	-	-	-	-	-

Legend:

P--Predominant, over 50 percent.
A--Abundant, 10 - 50 percent.
S--Subordinate, 2 - 10 percent.
M--Minor, 0.5 - 2 percent.
F--Few, 0.1 - 0.5 percent.
T--Trace, less than 0.1 percent.
X--Detected.
N--Sought but not detected.
C--Rock classification.

1/ Tentatively.

Radioactivity and fluorescence were not detected.

TABLE 4. - Windy Creek copper, petrographic results

	Sample No.								
	25	27	28	29	30	31	32	33	34
Spectroscopic:									
Cu	T	N	T	T	N	T	T	T	T
Ga	N	T	N	N	N	T	N	N	N
Zn	N	T	N	T	N	N	N	N	N
Ag Be Bi In Mo Nb	N	N	N	N	N	N	N	N	N
Ni Pb Sn Y Zr	N	N	N	N	N	N	N	N	N
Cr Mn	T	T	T	T	T	T	N	T	T
V	N	T	T	T	T	T	N	N	T
Ti	T	T	X	T	T	T	T	T	T
Rocks:									
Andesite	-	C	C	C	-	C	-	-	-
Diorite	-	-	-	-	C	-	-	-	-
Epidosite	-	-	-	-	-	-	C	C	-
Gabbro	-	-	-	-	-	-	-	-	C
Quartz diorite	C	-	-	-	-	-	-	-	-
Minerals:									
Andesine-oligoclase	A	A	P	A	A	A	-	-	-
Augite	-	P	A	-	-	A	-	-	A
Chlorite	A	-	-	A	A	A	-	A	A
Diopsidic augite	-	-	-	-	A	-	-	-	-
Epidote	-	-	-	-	-	T	P	P	-
Hematite	-	F	-	-	-	-	-	-	-
Hornblende	A	-	-	A	M	-	-	-	-
Ilmenite[1/]	F	-	-	F	T	-	-	-	T?
Labradorite	-	-	-	-	-	-	-	-	A
Magnetite	M	-	T	F	T	T	-	-	F
Quartz	A	-	-	S	S	-	A	A	-
Sericite	S	-	-	-	-	-	-	-	-

Legend:

P--Predominant, over 50 percent.
A--Abundant, 10 - 50 percent.
S--Subordinate, 2 - 10 percent.
M--Minor, 0.5 - 2 percent.
F--Few, 0.1 - 0.5 percent.
T--Trace, less than 0.1 percent.
X--Detected.
N--Sought but not detected.
C--Rock classification.

1/ Tentative.

Radioactivity and fluorescence were not detected.

TABLE 5. - Windy Creek copper, sample notes[1/]

Sample No.	Notes
2	Calcareous rocks east of locality 3.
9	Petrographic of sample 8.
11A)	
11B)	Talus fragments east of locality 3.
11C)	
12	Calcareous rock from locality 8.
13	Volcanic rock east of locality 8.
17	Volcanic rock near sample 16.)
18	Volcanic rock near sample 14.) Locality 9.
25	Dike just east of locality 11.
27	Footwall, locality 11.
28	Hanging wall, locality 11.
29)	
30)	
31)	
32)	Random specimens of local rocks, vicinity of localities 10 and
33)	11.
34)	

1/ Includes only samples not specifically referred to in text or table 1.

CONCLUSIONS

Concentrations of copper minerals at localities Nos. 4 and 11 (fig. 3) are the largest described in this report, but appear relatively small. Both are isolated from other copper mineralization. Further work is not recommended on the basis of present exposures.

Disseminated deposits of large, low-grade-type are unlikely in the area visited. Most mineralization was seen in small, widely separated concentrations. Rocks between (mostly volcanics) appeared unmineralized on field inspection. Petrographic study of a few specimens showed some to carry traces of copper, but none contained copper minerals.

Any further work initially should be oriented toward detailed geologic study.

The Pass Creek copper deposit, where active exploration has been conducted for several seasons, lies a few miles east-northeast just over the divide from the head of Windy Creek. Geologic relationships, however, are not the same as in the area described in this report.